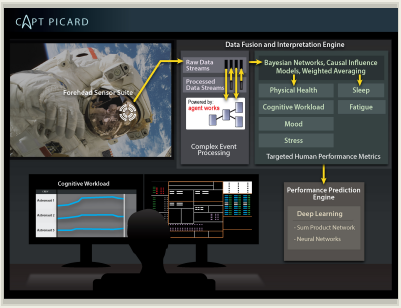
Small Business Innovation Research/Small Business Tech Transfer

Cognitive Assessment and Prediction to Promote Individualized Capability Augmentation and Reduce Decrement (CAPT PICARD), Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

Manned NASA missions include long periods of low workload, followed by sudden, high tempo operations. This can be detrimental to situational awareness and operational readiness. During these missions, disrupted sleep, long-term motion exposure, lack of normal gravity, and other operational characteristics result in fatigue, stress, decreased mood, and impaired cognitive and psychomotor functioning. An unobtrusive system to measure, assess, and predict astronaut workload could warn astronauts or mission control when steps should be taken to augment cognitive readiness. This system would also be useful during testing and engineering when tools and systems are being evaluated. Engineers could accurately evaluate the cognitive and physical demands of these tools, and the effects they will have on task performance and accuracy. Charles River Analytics proposes to design and demonstrate a system for Cognitive Assessment and Prediction to Promote Individualized Capability Augmentation and Reduce Decrement (CAPT PICARD). CAPT PICARD will: (1) use a suite of sensors to perform real-time synchronous data collection in a robust and unobtrusive fashion, and provide a holistic assessment of the astronaut; (2) extract, fuse, and interpret the best combination of indicators of astronaut state; (3) comprehensively predict performance deficits, optimizing the likelihood of mission success; and (4) display the data to support the information requirements of any user. Phase I goals defined in the solicitation are a literature review and design of an algorithm to assess workload. These will be a major focus; however, there is substantial overlap between CAPT PICARD and related efforts at Charles River. Therefore, we will go beyond that expectation and demonstrate a functional prototype. Meeting these requirements will dramatically improve astronaut mission readiness and the design and development of the tools used to assist them in carrying out mission objectives.



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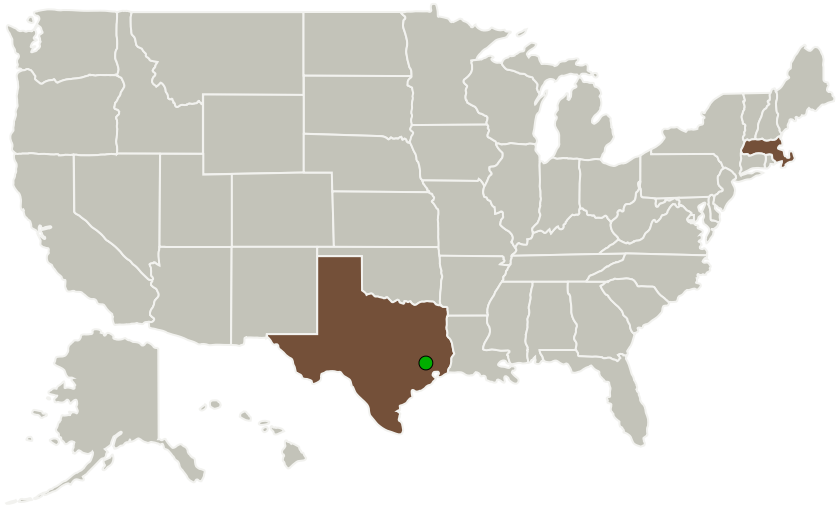
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Charles River Analytics Inc.	Lead Organization	Industry	Cambridge, Massachusetts
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Massachusetts	Texas

Project Transitions

June 2015: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Charles River Analytics Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

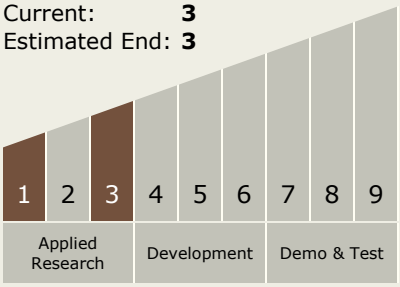
Carlos Torrez

Principal Investigator:

Bethany K Bracken

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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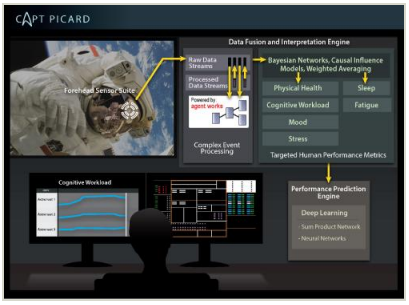
December 2015: Closed out

Closeout Summary: Cognitive Assessment and Prediction to Promote Individua lized Capability Augmentation and Reduce Decrement (CAPT PICARD), Phase I P roject Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138744)*

Images



Briefing Chart Image
Cognitive Assessment and Prediction to Promote Individualized Capability Augmentation and Reduce Decrement (CAPT PICARD), Phase I
(https://techport.nasa.gov/image/131022)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.6 Human Systems Integration
    - TX06.6.1 Human Factors Engineering

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System